October 17, 1950

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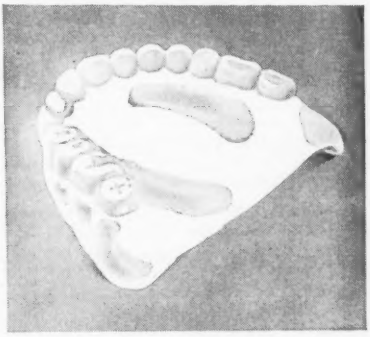
First impressions . . .



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BRITISH DENTAL JOURNAL

The Journal of the British Dental Association

VOL. LXXXIX OCTOBER 17, 1950 No. 8

ORIGINAL COMMUNICATIONS

FIBROUS DYSPLASIA OF BONE: ARRESTED JAW LESIONS

By MARTIN A. RUSHTON, M.D., F.D.S. R.C.S.Eng.

In 1938 Lichtenstein and in 1942 Lichtenstein and Jaffe designated as fibrous dysplasia of bone a condition which corresponded with the bony changes of Albright's syndrome and which has also been called multifocal osteitis fibrosa and other names. The condition is characterised by changes in one or many bones which consist in resorption of the spongy bone and to some extent of the cortex, and replacement by fibrous tissue of the bone and marrow. In this fibrous tissue osteoid and bone and occasionally cartilage can develop; or the fibrous tissue may undergo mucinoid (myxomatous) degeneration. It is principally a disease of childhood and adolescence, has a tendency to unilateral distribution, and tends to become less active or quite inactive after maturity is reached. It is regarded as a developmental anomaly.

The dental interest of this matter is that in the opinion of some a high proportion of fibro-osseous abnormalities of the jaws, including many or most of those which have been called local osteitis fibrosa and ossifying fibroma, should be regarded as among the forms of this disease in which only one bone is affected. Thus Crane and Wolgamot (1948) think that no distinction can be drawn between polyostotic and monostotic fibrous dysplasia in the jaws and so-called ossifying fibroma, though Scarff and Walker (1948) regard the usual maxillary lesion as distinct and of the nature of a developmental hyperplasia, and others continue to consider it as an ossifying fibroma. Schlumberger (1946) moreover, who accepts the term fibrous dysplasia, regards the polyostotic and monostotic forms as different entities. The position is thus far from clear. There is not even agreement as to the usual termination of the jaw lesions: generally speaking, those who regard them as fibrous dysplasia or developmental hyperplasia consider that they stop growing spontaneously in the adult, while those who think them benign neoplasms say they go on growing indefinitely though probably with progressive differentiation. In spite of this there is at least almost complete agreement that cosmetic operations are all that is required, though occasionally further enlargement after such an operation will take place. If these lesions do not continue indefinitely, what is their final state? As a contribution to this problem three cases will be mentioned: in the first both jaws were affected. A limited number of cases of fibrous dysplasia affecting both jaws or one jaw at the same time as other bones has been reported at various times often under other names: Albright (1937), Kaletsky (1938, quoted by Lichtenstein and Jaffe, 1942), Phemister and Grimson (1937) case 13, Rushton (1947) case 1, etc. In the following case the condition in the mandible at the time of histological examination appeared to have reached a state of almost complete spontaneous arrest with mucinoid degeneration of fibrous tissue.

The patient, a woman of 37, was under the care of Mr. S. H. Wass at Guy's Hospital. When a girl of 17 she fell on her upper front teeth and subsequently noticed enlargement of this region. At the same time skin nodules thought to be adenoma sebaceum appeared around the nose. At 25 years the anterior part of the maxilla was resected on account of bony enlargement and a section was reported as "fibrous osteitis." At 31 years she had an irregular swelling of both sides of the anterior part of the mandible, first noticed three years before, a tooth had loosened and the swelling was cystic in places. There was considerable resemblance to an adamantinoma but a biopsy was performed and a section was reported as "mucoid fibroma or fibrous osteitis." At 37 years she still showed considerable enlargement of the maxillary alveolus on the left with the homogeneous fine-grained trabeculation common in this bone and with much obliteration of the antrum and an operation defect anteriorly. The swelling had ceased to grow. The $\underline{|8}$ was buried near the orbital floor suggesting that the dysplasia may have started earlier than the accident at 17 years. The mandible showed apparently cystic enlargement extending from $\overline{7}|$ to $|\overline{7}$ (fig. 1). Fluctuation could be obtained

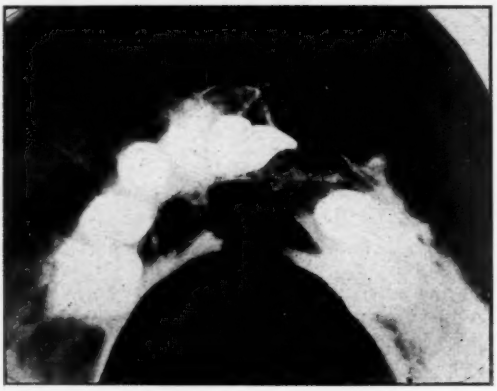

FIG. 1.—Occlusal X-ray film of mandible showing polycystic appearance.

on one cystic swelling protruding against the lower incisors. Radiographs also showed areas resembling periostitis on the right radius and one tibia. Chemical studies showed nothing abnormal. Mr. S. H. Wass decided to operate upon the mandible. The remaining lower teeth were removed together with the outer plate and the bone cavities were evacuated. These were found to be filled with mucinoid material. Healing was good, artificial dentures were fitted and after two years they are still worn with comfort.

Histological examination of tissue removed showed replacement of bone and marrow by tissue which had undergone mucinoid degeneration. The appearance was the same in all parts examined. Fig. 2 shows a section through one of the cyst-like areas with mucinoid tissue within the atrophied bony wall of the jaw. In many places the cortex had disappeared completely and the mucinoid tissue lay directly under the periosteum. In others slow absorption of the inner wall of the cortex was still occurring. Sections of a lower molar with some surrounding bone showed that the abnormal tissue was in most parts separated from the tooth by a thin layer of bone but that this had been lost at the apices and one apex was partly absorbed (fig. 3).

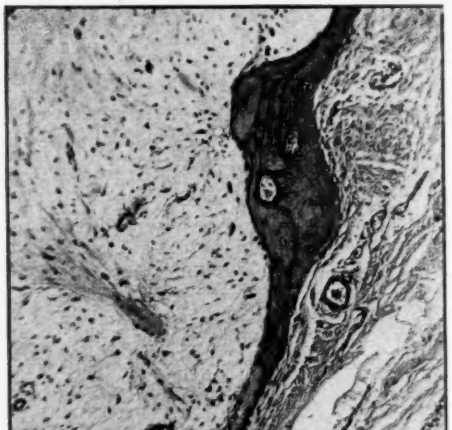

FIG. 2.—The atrophied remnant of the mandibular cortex is seen covered by periosteum. The spongiosa and marrow have been replaced by mucinoid tissue. × 80.

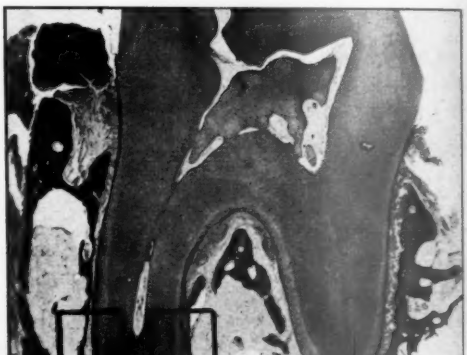

FIG. 3.—Lower molar situated in bone which has been partly resorbed and replaced by tissue which has undergone mucinoid change. × 5·5.

In some parts the periodontal membrane was intact (fig. 4) but in others the periodontal space had become completely or partly occupied by the same mucinoid tissue as the marrow spaces (fig. 5). The degenerating remnants of the periodontal fibres can be seen. A canine tooth showed the same changes.

The sections show one of the possible terminations of fibrous dysplasia, in which the fibrous tissue which had replaced the bone had undergone mucinoid change, but this is not the usual termination in the jaws. An interesting

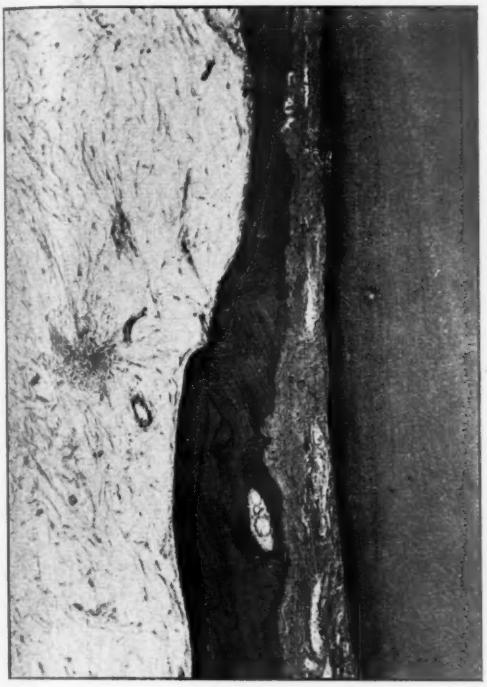

FIG. 4.—The area indicated in the right frame of fig. 3. The periodontal membrane is separated from the mucinoid tissue by alveolar bone. × 70.

feature is that the mucinoid degeneration which had arisen in the replacing fibrous tissue had now extended to such normal structures as the periodontal fibres.

There seems to be a tendency for lesions in the upper jaw to take the form more frequently of an even fine-meshed hyperostosis, while those in the body of the mandible in the same cases are less homogeneous in character with patchy areas of bone loss and sometimes sclerosis. If a part at least of the new bone formation be interpreted as resulting from an increased susceptibility of the bone to stress, following resorption (as Albright (1948) has suggested is the case in Paget's disease), any greater hyperostosis in the maxilla than in the body of the mandible can be related to the extremely economical structure of the former compared with the more massive and densely corticated mandibular body, a bone adapted to withstand not only masticatory forces but also external violence. Mandibular hyperostosis is found more commonly in the region of the angle which may be thought particularly subject to strain. It is evident in any case that a variety of appearances is consistent with the same diagnosis and that the similar variety seen among single lesions, where again a fine-meshed hyperostosis is characteristic in the upper jaw, does not in itself conflict with a belief in the identity of single and multiple lesions.

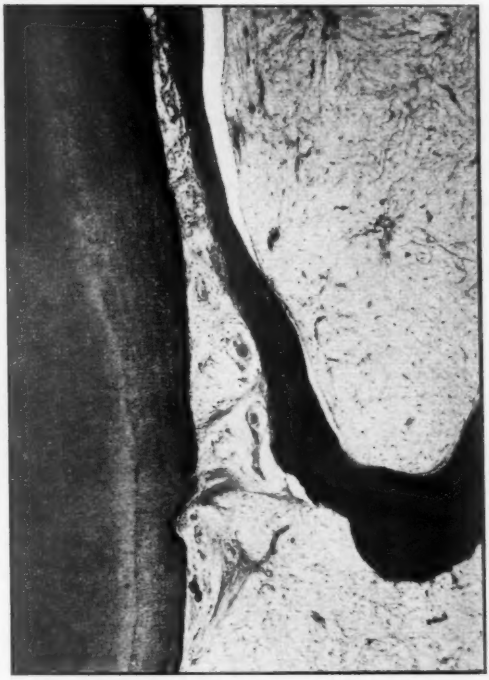

FIG. 5.—The area indicated by the left frame in fig. 3. The periodontal fibres are undergoing mucinoid change. × 45.

Differences in the histological picture between various single lesions having the same age and site incidence, diffuse delimitation, radiographical appearances, and, in the opinion of many, tendency to spontaneous arrest, are often considerable and can be used to separate the material into different groups under different names. On the other hand a variety of appearances would be expected at different times in a condition which is characterised by rapid bone changes at an early stage, then retardation, arrest, and possibly return towards normal. The material most frequently available, obtained from cosmetic operations, often shows a relatively static picture and may generally represent a lesion in which the active stage is almost or quite ended—as the usual success of

almost any kind of operation would also suggest. Any attempt to interpret the various appearances as a chronological sequence must, in the absence of repeated biopsies from a single case, entail the danger of creating an artificial series from essentially dissimilar conditions; nevertheless a very reasonable attempt has been made by Weinmann and Sicher (1947), for example, who show a succession of stages of "ossifying fibroma" leading from a highly cellular state with bundle-bone formation to one in which the surface of the lesion is lamellar bone with fibrous marrow, while its centre contains much absorbed and fully calcified remnants of bundle-bone. Without accepting the term ossifying fibroma and without prejudice to the question as to whether Paget-like sections from young patients ought to form part of such a series, the following two cases could be regarded as further stages in the same process. They both showed typical hyperostotic single maxillary lesions of the common diffuse type.

The suggestion is made that as the stimulus to excessive resorption of calcified bone and to the formation of excessive fibrous tissue and new bone ceases, either consecutively or concurrently, there is a tendency for the bony mass to undergo further remodelling changes involving the removal of excess bone, the reorientation of trabeculæ to a more economical pattern with the substitution of a cortex and spongiosa for a thick mass of spongy bone, and the substitution of lamellar for bundle-bone where still present and fatty for fibrous marrow. It is common in fact to find specimens in which there is little evidence of rapid bone changes, where the trabeculæ are composed of lamellar bone, sometimes enclosing bundle-bone and with or without mosaic markings, where the deeper lying bone has been much resorbed without new apposition, and where sometimes there appears to be reorganisation of the cortex. Fig. 6 shows a specimen from the maxilla of a woman of 31. The deeper bone is non-lamellar, fully calcified and has undergone considerable resorption now arrested. The subperiosteal bone is lamellar but shows some mosaic markings and the marrow is partly fatty.

The return towards a normal pattern is evidently a very slow process and is probably rarely completed. The following case appears to illustrate a more advanced stage in which the return to a more normal histological pattern has been accompanied by only slight anatomical rearrangement.

The patient was a woman of 61, who had had an enlargement of the left upper jaw "for a long time." It affected the facial and antral aspects and notably the alveolar process from the tuberosity to the mid-line, rather more on the buccal side and thickest in the canine-premolar region. Radiographs showed an evenly distributed fine trabeculation of "orange-peel" type (fig. 7), ceasing at the median palatine suture but without other defined boundaries, and a few rarefied patches. Radiographs of other bones showed no abnormality. During the removal of some roots a piece of bone was taken from the buccal side of the premolar region. Instead of showing on histological examination the fibrous marrow and other features usually associated with the radiological appearance, the material showed fatty marrow and lamellar bone (fig. 8). Though there was evidence of very slight recent bone apposition in a few places, there was none of resorption. There was a good cortex, though this is not evident in the radiographs.

What proportion of cases reaches a termination of this kind is not known. Very few cases have been followed up for long periods and re-examined histologically, though the

FIG. 6.—From the maxilla of a woman of 31. The subperiosteal bone (bottom) is lamellar and contains fatty marrow. The deeper bone is non-lamellar, has been much absorbed and is fully calcified. × 30.

FIG. 7.—Radiographs showing hyperostosis with "orange-peel" appearance in the maxilla of a woman of 61.

FIG. 8.—Section of bone showing fatty marrow, lamellar bone and inactive appearance. × 36.

opportunity for this must arise not infrequently when the shape of the jaws has to be adjusted to facilitate the wearing of artificial dentures.

SUMMARY

Arrested jaw lesions in fibrous dysplasia are described. An attempt is made to interpret different histological pictures as a sequence.

ACKNOWLEDGMENTS

I am indebted to Mr. J. F. Dudley, A.I.M.L.T., and Mr. J. E. Hutchinson for the histological preparations and to Mr. Hutchinson for the photomicrographs.

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A MODIFIED FLAP METHOD OF GINGIVOPLASTY

By ERIC SCHOFIELD, L.R.C.P., M.R.C.S., H.D.D.Edin., L.D.S.Eng.

Although the treatment of parodontal disease by gingivectomy has now become a recognised method of treatment, flap operations do not seem to have been used much in this country.

The straightforward operation of gingivectomy has, however, two marked disadvantages. Firstly, where pocketing is of unequal depth, the resulting irregular gum levels are unsightly. Secondly, a large raw area is often left especially in the upper molar region which has to heal by scar tissue formation and epithelialisation, and such areas do tend to break down under stress (fig. 1).

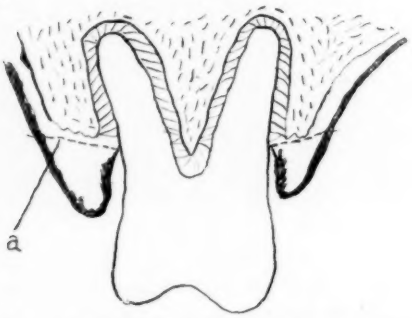


Fig. 1.—a, Line of orthodox incision for gingivectomy.

During the war one saw several facial wounds where the cheek tissues and gingivæ had been stripped from the mandible. When these gingival tissues were repositioned accurately and sutured into place by fine ligatures through the interdental papillæ, they healed in a remarkably healthy condition. Again, for many years incisions have been used for minor oral surgical procedures which run along the necks of the teeth and such incisions heal with healthy gum margins. There, therefore, seemed no reason why a flap turned up for the cure of parodontal disease should not heal in a similar manner if the subgingival epithelium and granulation tissue could be eradicated; the procedure described below is an attempt to do this.

Technique

A pre-operative scaling is done about a week before commencing the surgical procedure. Ætiological factors such as traumatic occlusion also receive attention.

The operation itself is usually performed sectionally under local anæsthesia, but with nervous patients the whole mouth may be done under endotracheal gas-oxygen-ether.

With local anæsthesia it is helpful to give Seconal, 1½ grains half an hour beforehand. In the lower jaw block anæsthesia—both inferior dental and mental foramen—is used, while in the upper jaw infiltration anæsthesia together with injections over the anterior and posterior palatine foramina are sufficient.

The first incision is made at an angle of about 30 degrees to the tooth, 2 mm. or so away from the crest of the gingivæ, and is carried to the depth of the pockets (fig. 2). This is done on both buccal and lingual sides. This incision is one of the most important parts of the operation because the external lining of the pocket is thus separated from the main flap of mucoperiosteum. It is easier to make this incision at the start and peel the strip off when the flap is turned up than to try to slice off a thin layer from the loose flap later.

Fig. 2.—The first incision.

The second incision is made round the necks of the teeth and down the outer side of the alveolar process sufficiently deeply to expose the bone margin when the flap is turned back (fig. 3). Incisions are also made at either end of the section to be operated upon running from the gum margin towards the sulcus. Flaps are turned back buccally and lingually

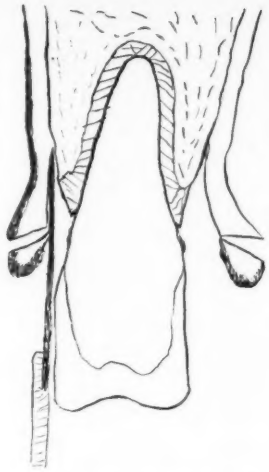


FIG. 3.—The second incision.

with a small periosteal elevator and the bone exposed. The strip of tissue which was partially separated by the first incision is now peeled off (fig. 4). Any granulation tissue remaining be-

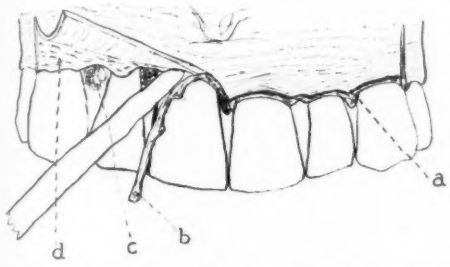


FIG. 4.—Raising buccal flap. a, Line of first incision; b, strip of gingival tissue peeling off; c, interdental granulation tissue; d, bone.

tween the teeth is carefully curetted away and irregular bone margins are smoothed over. Subgingival calculus which has escaped the preoperative scaling is also removed. The area is syringed with weak penicillin solution (1,000 units per c.c.) and the flaps stitched back with fine silk sutures passed interdentally (fig. 5 A and B).

A packing of modelling wax, into which a few fibres of cotton-wool have been impregnated, is placed around the teeth to protect the gum margins. This is more satisfactory at this stage than zinc oxide and cloves which tends to squeeze between the flap and the bone and retard healing. The patient is given an intramuscular

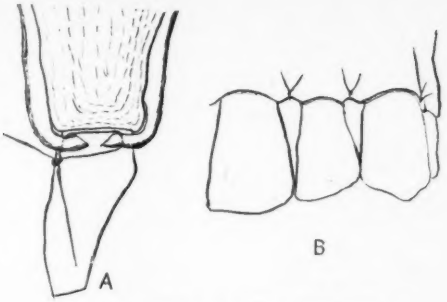


FIG. 5.—Flaps stitched back interdentally.

injection of 100,000 units of penicillin and instructed to use hypertonic saline mouth washes.

At the end of two days the wax pack and sutures are removed and the area repacked with zinc oxide and cloves which is left in situ for a further ten days.

COMMENT

This operation aims at removing the subgingival epithelium and granulation tissue and reattaching the raw surface so produced to the bone and tooth. Some reattachment to the tooth surface does seem to occur although the healed gum margin is far higher up the root surface than before the operation.

The writer has been using this method in selected cases since 1944, and has found that the teeth become much firmer than after a gingivectomy and the gum remains healthier. In those cases where only part of the mouth was treated by this form of flap operation, that part has remained healthier and the teeth firmer than was the case with the remainder of the mouth which for the sake of sparing the patient discomfort had been treated by straight gingivectomy. The flap operation also gives a very much better æsthetic result.

The disadvantages of the method are, firstly, the time taken over the procedure, and, secondly, that the patient has more post-operative discomfort than after a gingivectomy. This was even more marked in the days before penicillin became generally available.

SHORT COMMUNICATION

A NOTE ON THE PUBLIC DENTAL SERVICE IN MALTA

BY C. H. RUBRA, L.D.S.ENG.

DURING a recent visit to Malta I was privileged, through the kindness of the Prime Minister, Doctor

Boffa, and by courtesy of the Chief Government Medical Officer, to meet Doctor Stilon, Senior Health Officer, and to have interesting discussions with him and with medical and dental members of the Health Service. I was also taken over the School Dental Clinic and the Dental Department of the Central Hospital, where I had further talks with the dental surgeons.

There are a number of reasons why Malta Health Services are specially interesting to anyone with P.D.O. or Ministry of Health experience. The Maltese Islands, like our own, are over-populated absolutely and relatively to a housing shortage aggravated by enemy action ; like our own, their population is predominantly urban. Like us, they entertain the ideal of a comprehensive health service, remedial and preventive, freely available to all. Unlike us, they have as yet been prevented by lack of funds from realising these aspirations. Unlike us, they have (since 1948) withdrawn their school service from Board of Education control and have centralised all public health work under the Ministry of Health. Unlike us, they have no local authorities. Like ours, their public health officers, medical and dental, are underpaid . . . and keep the wolf from the door by private practice after hours. (Public Health hours are approximately 9 to 4. A dental officer's maximum salary is £480, or less than half what is earned by a private practitioner. A medical officer is even worse off.)

The population of Malta is 305,991 with an average density of 2,511 per square mile. There are some 200 doctors and 20 dentists. The school population is approximately 50,000. There are 2 whole-time school dentists, 2 part-time qualified assistants, and 2 dental nurses trained to perform simple hygienist duties. In addition to the school dental clinic, there is a public dental clinic at which dental services are free to necessitous patients. Hospital services, normally contributory, are free, subject to a means test. There are Government dispensaries providing free medical treatment in every town and village.

A Health Propaganda Officer has been appointed by the Government, and has organised open-air talks and film displays at which attendances have been most encouraging. Among films shown has been " Care of the Teeth." A panel of doctors give weekly health talks over the radio. School dental inspections, which in other respects would appear to be excessive in relation to the number of school children acceptable for treatment (*see* Table), are also used for dental health education purposes.

A gap in the Malta Health Services, as in our own, exists between the Infant Welfare and the School Medical Service, children aged 2 to 4 being lost to the public health pædiatrician. From the dental point of view, the closing of this gap provides, of course, the only satisfactory background against which the deciduous dentition can be conserved and the foundations of a fully functional permanent dentition laid.

Malta has as yet no ante-natal services. This (as all with whom I discussed it agreed) is a serious deficiency. As important as ante-natal examinations is the golden opportunity these provide for health propaganda. Ante-natal services can hardly be considered adequate unless they include at least emergency dental treatment (relief of pain and sepsis) and dental health education.

The work done by the School Dental Service during 1948 and 1949 was as follows :

SUMMARY OF THE SCHOOL DENTAL FIGURES FOR 1948 AND 1949

	1948	1949
Inspected	9,112	9,364
Requiring treatment	4,274	3,025
Number receiving complete treatment ...	3,365	3,521
Number receiving emergency treatment only	1,133	1,355
Permanent teeth filled	1,463	1,353
Deciduous teeth filled	547	322
Permanent teeth extracted	1,212	813
Deciduous teeth extracted	4,362	4,157
Inspection sessions	150	Not available
Treatment sessions	588	Not available
Gas sessions	12	25
Refused or failed to attend	1,605	Not available

The number of fillings will probably increase when the electric engines that have been ordered become available. In other respects working conditions are very fair. Facilities exist for the occasional construction of jacket-crowns and one-tooth dentures—valuable weapons in the propaganda war for increased tooth consciousness. A useful addition would be facilities for the construction of simple appliances for the correction of misplaced incisors, mouth-breathing, etc. At present orthodontics is by extraction only or, in special cases, by reference to the Central Hospital.

Although the caries incidence in Malta appears to be low by English standards, it may not be so by Southern Mediterranean standards, and a comparison with figures for, say, Naples and Sicily would be of interest.

A staple article of diet among the poor is oil-soaked bread and beans. Unlike the South Italians or Sicilians, the Maltese get little fruit or wine with which to wash down their carbohydrates.

It is possible that if and when Malta introduces a National Health Service (and this was a plank on the political platform of the Mintoff—or left Labour—Party at the recent election), the policy will not be followed of, as with us, introducing the service at the expense, instead of by reorganisation and extension of, the existing preventive health service.

EVERYDAY PROCEDURES IN DENTISTRY

CONSERVATION OF THE DECIDUOUS TEETH

By G. E. M. HALLETT, F.D.S. R.C.S.Eng., H.D.D.Edin.

There are two ways in which we can discuss the details of operative dentistry for the deciduous dentition. The time honoured one has been to approach the subject in terms of ideal tooth morphology alone, as though no destruction of tooth tissue had occurred at all from dental caries, or if it had, that such destruction was negligible. This conception presupposed ideal conditions of caries detection, very early treatment, and the type of patient one dreams of. It was very apt to ignore the fact that, however desirable it may be to work under such conditions, the majority of the cavities we meet in deciduous teeth have progressed to such an extent that the pulp is very nearly, if not actually, exposed. Section of a large number of deciduous teeth, where caries has spread from the proximal to the occlusal surface, leaves me convinced that these two-surface cavities are, for the most part, very much more extensive lesions than is often imagined.

I have attempted therefore in this paper to approach this problem in terms of the actual types of cavities that we meet daily in practice. This does not mean, of course, that I do not think that good dentistry for children is based upon regular inspection from an early age—utilising the bite-wing film and probe for detection of the incipient cavity. That is an ideal towards which we must continually strive; for it cannot be denied that the most satisfactory fillings in deciduous teeth are precisely those which are inserted before the caries has progressed far into the dentine. The illustrations in this paper, with the exception of fig. 6, have all been taken from actual specimens, including the burs, traced optically. Permanent and deciduous teeth, thicknesses of enamel and dentine and the different sizes of bur are therefore strictly comparable one with each other in the same illustration.

Deciduous Incisors

Interstitial cavities.—These teeth are exceedingly small with relatively large pulp cavities. Preparation of interstitial cavities requires such precision and delicacy of instrumentation, using the smallest burs, that subsequent lining and restorations are unlikely to be successful. It may be seen from diagram 1 how dangerous it would be to use even a No. 3 rose-head bur in either a central or lateral deciduous incisor. In the lower incisors the difficulties are greater still, though fortunately these teeth escape carious attack more often than the remainder. It is best then, in these cases, to convert these interstitial cavities into self-cleansing areas by discing the incisors so as to produce a wedge-shaped inter-dental space (*see* dotted line fig. 1).

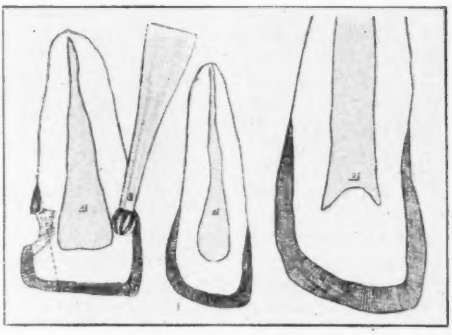


Fig. 1.

If necessary the exposed dentine may be treated by precipitation from ammoniacal silver nitrate using iso-eugenol. The latter is less aromatic and therefore less objectionable to young children than clove oil. The result of this treatment is not of course attractive, but it is much more certain as a tooth saver than cavity preparation and filling. The young child has only a limited amount of tolerance to dental procedures and this must be carefully nursed, so that it is better to confine cavity preparation to the canines and deciduous molars which it is so important to preserve. Fortunately, where deciduous incisors inevitably have to be lost early, such a loss is not usually followed by the dire results caused so frequently by early loss of the temporary canines and molars. When discing the teeth for these youngsters, use small safe-sided diamond or carborundum discs $\frac{5}{8}$ in. or less in diameter. Avoid the larger ones which may easily injure the lower lip, and keep the rotating disc well wetted by cold water, thus ensuring a clean field and avoiding over heating.

Labial Cavities.—Owing to some profound metabolic disturbance or infection during the first year of life, the cervical portion of the enamel is sometimes less well formed than the incisal enamel, and labial decalcification and cavities may result. It is justifiable to attempt the filling of these cavities. Using a straight handpiece and a No. 3 inverted cone which is not sunk beyond the actual depth of the head, the cavities are opened out to sound surrounding tissue, and filled with amalgam which is subsequently well polished. Silicate fillings should not be inserted in these cavities, and unless they are very small they should be lined with a very thin layer of oxyphosphate cement. It is, unfortunately,

difficult to secure this thinness of linings with a zinc oxide cement, and a good compromise may be made by incorporating a trace of clove oil with the oxyphosphate cement during spatulation. Where the decalcification is so extensive that sound cavity margins are impossible, then heavy and repeated precipitation of silver from ammoniacal silver nitrate must be employed. Always enquire from the parents about a possible history of abscess formation in these cases and search for evidence of old sinuses above the apical areas. Abscessed incisors should always be promptly extracted.

Canines

The deciduous canine is a slightly more solid tooth than are the incisors and cavities develop most commonly on the distal surfaces, often in conjunction with a mesial cavity in the first deciduous molar. Access is not easy but is best accomplished by using a contra-angle handpiece and No. 3 rose-head bur. Using a gentle sweeping motion, never a penetrating one, the soft caries is rapidly removed. Adequate retention is often a problem and, as amalgam again is the material of choice, a key may be cut to reinforce the restoration. It is much more convenient to cut this key on the *labial* surface rather than on the lingual one and again the straight handpiece, which always lends itself to precise control, is employed using a No. 3 inverted cone bur. Should the first deciduous molar be already lost, this labial extension may not be necessary, as then one has better access for the cutting of an opposing point.

Compress the amalgam in the cavity by means of a piece of thin matrix metal trimmed to a suitable shape, and polish well at a subsequent visit. Mesial cavities in deciduous canines are more easily prepared, using the straight handpiece and Nos. 3, 2, and 1 rose-head burs and Nos. 2 and 1 inverted cones.

Deciduous Molars

These teeth decay so rapidly that at age 5 only 20 per cent of all children are free from caries, and careful radiographic bite-wing examination would probably lower this percentage considerably. Many thousands of fillings are inserted annually into these teeth which prove unsatisfactory and delay their complete loss only for a short time. This is most unsatisfactory and may do much to prejudice parents and children permanently against the value of conservative work. Satisfactory deciduous fillings depend, then, upon :

(1) Very early diagnosis by (*a*) regular visits from an early age (at least as early as 2 years). (*b*) Thorough inspection of the teeth by mirror and probe in a good light. (*c*) Use of X-rays to detect incipient cavities.

(2) Thorough cavity preparation, observing standard principles, modified by a clear understanding of the special anatomy of the deciduous teeth.

(3) Restoration of the teeth by suitable and durable materials inserted and finished with the maximum of care.

It may be said here that for cavities which are detected early, where there is plenty of sound tissue and where the tooth has several years to go to fulfil its normal life, the best restorative material of all is a hard gold of about 18 carat. It is strong in the small bulk permissible, is not liable to fracture and is exceedingly durable. There is a sense of finality in the inserted gold inlay which is encouraging and which fully justifies its use in the *suitable and responsive child.*

The next best filling material is silver amalgam, which must remain the most widely used, but it is a material which is greatly abused and which gives disappointing results.

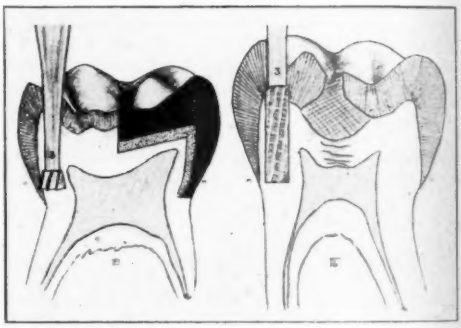


Fig. 2.

Fig. 2 shows a normal lower deciduous second molar compared with a normal lower permanent first molar. Both these illustrations are taken from direct tracings of teeth on the same projection. It is at once obvious that deciduous enamel is very much thinner than permanent enamel, being only half or less than half as thick. The dentine often stated to be half the thickness of permanent dentine is relatively about the same and actually about two-thirds the thickness. The pulp chamber is relatively much larger and is actually nearer the surface than in the permanent molar. Also it has projecting cornua which render it liable to both carious and instrumental exposure. At the level of the cervical margin, there is very little hard tissue indeed covering the pulp and here it is actually and relatively only about half that of the permanent teeth. This is readily appreciated when burs of known sizes enlarged to precisely the same degree as the teeth are superimposed upon the sections (diagrams fig. 3).

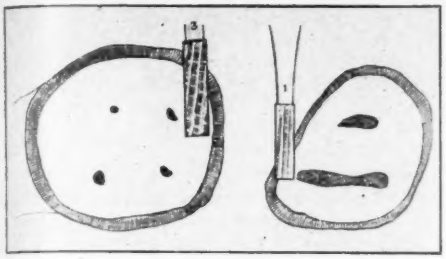


FIG. 3.

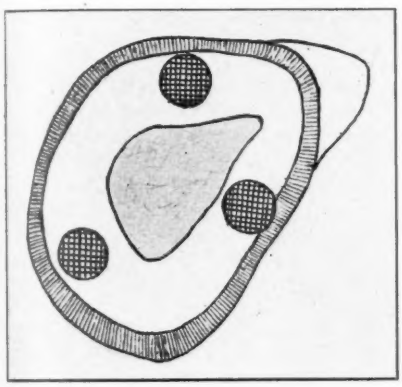


FIG. 4.

Fig. 4 shows a cross section of a deciduous second molar at gum margin level with 3 pits made by a No. 3 fissure but at different sites. These illustrations will demonstrate what is a well-known fact : that where the greatest danger of exposure lies is on the mesial horn, usually the mesial buccal horn. Even when preparing a relatively sound tooth, using perhaps a flat fissure bur to open up the proximal cavity, this proximity of the mesial buccal horn to the surface must be remembered for it is all too easy to expose it. This lack of tissue for preparation has, of course, a serious effect upon the restoration. Amalgam, even when well mixed, is a relatively friable material and fractures easily in thin sections. Just how thin it is may be seen by transferring what is apparently a sound filling in a deciduous molar (fig. 2) to an average first permanent molar (fig. 5). Relating the amalgam filling section to the burs, etc., it is obvious that any heavy vertical stress may easily fracture the filling. This may happen not only when the amalgam is hard, but commonly happens before it has time properly to set. Faced, with this unavoidable limitation in depth, the only other way to counteract the weakness is to seek additional strength in width ; though it must be realised that

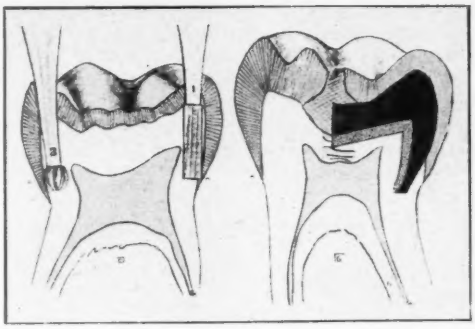
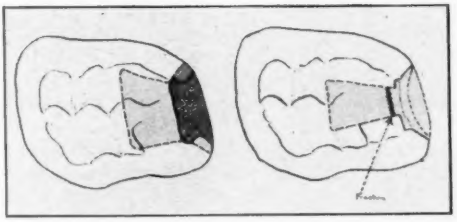


FIG. 5.

this will not wholly make up the missing strength. In general then, with two-surface proximal cavities, anything of a narrow isthmus between the occlusal key and the body of the filling is to be avoided.



A FIG. 6. B

Fig. 6B shows an incorrect marginal outline and fig. 6A (dotted line) the one at which to aim. Interproximally the main thing is to remove all soft caries leaving all enamel supported by sound dentine. It will often be impossible fully to remove all caries over the pulp, and indeed it may be unwise to do so, but if any is left it should be island in nature and surrounded by a clean and definite margin of sound tissue. Caries, so left, should be minimal and treated by silver nitrate before filling. It will be noted that I have said nothing about using excavators and chisels. Personally I do not think that a young child reacts well to the pressure and grating sensation of even the sharpest chisel. Excavators, to my mind, are only of use if razor sharp and it is very difficult to keep them in this condition. Very small excavators are a positive danger in that they are liable to " dig in " to the soft caries and produce a carious exposure. Use, then, the largest excavator which is manœuvrable within the cavity so that the greatest portion possible of decalcified dentine is removed at each cut. Otherwise, clear out the soft caries using rose-head burs of the largest size possible, moving the head with a sweeping action, when the

bur becomes in effect a multiple excavator. Never use the bur with a penetrating motion. The decalcified dentine is relatively painless and only when sound tissue is reached is there any tendency for marked sensitivity to develop. Having cleared all the soft caries in this way and having washed the cavity thoroughly one is then in a position to examine it carefully and decide :

(1) How much sound tissue must be removed to leave well supported enamel, establish adequate retention form, eliminate caries recurrence and yet allow adequate bulk of amalgam after the lining has been inserted?

(2) What are the best shapes of bur that must be used in order to accomplish the above with the minimum number of changes ?

By using only new and sharp burs, and having a precise idea of what is to be done, and in how many stages, one can chat away to a child explaining the various steps to his enormous encouragement.

Nothing helps the patient more than a decisive air of progress on the part of the operator.

Common sites for recurrence of caries are under the cusps and at the interproximal cervical margin. It is important to eliminate these by cutting the walls back far enough (No. 3 or 4 rose-head burs will do this); for squaring the cervical margin, use the end of a No. 1 or 2 fissure bur, *not* an inverted cone or rose head. Handpieces must be in the best possible condition, no play being tolerable. Miniature burs and miniature handpieces are exceedingly useful, especially for the very young patient, but they have disadvantages in that the end of the miniature bur may be easily obscured by the head of the handpiece, and it is especially important to be able to see the cutting point when preparing these cervical margins. It may be taken as axiomatic that once the cavity has involved the occlusal surface even to a slight degree, a definite occlusal key of generous dimensions should be cut. Usually this is easily done, using a No. 5 inverted cone bur sunk to the depth of the head and no more. The enamel is so thin that it offers little resistance and the key may be cut rapidly and efficiently. If necessary the dovetail shape may be accentuated by means of a No. 1 or ½ fissure bur. On no account must the type of filling shown in fig. 6A (thick outline) be attempted. The retention is too frail and the filling will not be adequately locked into place, so that before long it will be lying loosely in a cavity enlarged by recurrent caries.

Single-surface cavities in molars are not difficult providing one bears in mind the crown's anatomy. Interproximal, Cl. 1, cavities are only possible where the adjacent tooth has been lost or is unerupted, and are invariably on the mesial surfaces. In all other cases it is necessary to extend on to the occlusal surface, cutting a key. Very small occlusal and buccal pits need not be lined, but all others should be. Large buccal cavities in molars extending along the gum margin are best filled by copper amalgam which maintains well in this area. Personally, I do not favour the copper-tin alloy.

Impregnation with Silver Nitrate

Where caries is so rampant that conservation is quite impossible, and if there is no sign or history of abscess and sinus formation, impregnation by silver nitrate should be attempted. It must be realised, however, that silver nitrate treatment must be done very thoroughly and with meticulous care to be of value, otherwise it is worthless as a tooth saver and the method has been very much abused. To get the full effect it is necessary to :

(1) Allow the ammoniacal silver nitrate solution to penetrate the carious dentine to a sufficient depth.

(2) Precipitate the silver (which is in the form of colloidal metallic silver) within the tubules.

If saliva comes into contact with the silver nitrate solution, there will be a premature precipitation of silver proteinate and silver chloride. This means that to be treated effectively the area of application must be absolutely dry before impregnation. It is unwise, therefore, to attempt to treat too many teeth at a visit—for instance, the upper incisors may be isolated conveniently, or each of the quadrants "c, d, e." To try and treat more than one of these sections at a time is to court failure.

Method.—Having syringed the area to be impregnated with plain warm water, isolate the teeth using cotton-wool rolls, and rapidly dry the carious surfaces with warm air. Apply the nitrate solution (Howe's) using a pledget of wool. The pledget should be thoroughly saturated yet not so charged with solution that it will drip off, either on to the mucosa or on to the patient's clothing. Try to maintain the solution in contact with the caries for 45 seconds by the clock. This time will vary according to the age and reactions of the child, and indeed it may be difficult to get more than 15 seconds with very small children. Immediately on removal of the solution, flood the area with a precipitant such as iso-eugenol, or clove oil. For those who do not wish to make up their own Howe's solution (which is an unstable solution and needs to be made freshly at frequent intervals) the proprietary medicament "Dontosil" will form an excellent and convenient substitute which has the additional advantage of being much more stable. These applications should be repeated at intervals the length of which will depend very largely upon how co-operative the child has been on the first occasion. Any silver nitrate in the wrong place, i.e. the mucosa, should be promptly

treated with strong common salt solution. Nitrate stains on the fingers may be treated by Mallard's stain remover.

Linings

With few exceptions already mentioned cavities should always be lined. If there has been any history of pain, check for vitality, history of sinuses, reaction to cavity preparation, etc., and dress for seven days with a stiff mixture of zinc oxide and oil of cloves. Remember that many a dead deciduous tooth has been filled leading, of course, to prompt trouble. Where there has been no discomfort either initially, or after the intervening period, remove the zinc oxide and line the cavity with oxyphosphate cement and clove oil as explained previously, filling with well-mixed and well-condensed amalgam.

Matrices

This brings us to the problem of matrices. The shape of the crowns of deciduous molars (especially the lower first molar) is such that the standard retainers and matrices do not hold well. They are also bulky and are not well tolerated by children. The most certain method is to make a band individually for the tooth, using a very thin material such as ·1 mm. (or ·08 if available) stainless steel. This may be trimmed to shape and pinched on to the tooth. The band is now cut to size and welded or closed by a tinsmith's joint. Thin brass shim may also be used and soft soldered very easily in the alcohol flame. Alternatively "Globe" celluloid matrix rings may be used. A band so formed provides a self-retentive matrix which may be left on till the next visit and then removed. The time consumed is very little more, if at all, than that spent in adopting a clumsy and inadequate standard type matrix retainer.

It is impossible to overstress the importance of eliminating any possibility of surplus filling material at the cervical margin. The deciduous molars are so markedly constricted at the necks that, once the contact points have been destroyed by caries or cavity preparation, the proximal surfaces recede sharply from one another. It is all too easy to fit an apparently satisfactory matrix which will have the effect of allowing amalgam or other filling material to extrude into the interproximal space (fig. 7). Once hardened it is almost impossible to remove this excess without causing considerable discomfort to the patient. These excessive ledges often cause severe parodontal trouble, and, not uncommonly, an erupting premolar becomes impacted beneath one of them. The remedy lies in careful contouring of the matrix or band using contouring pliers. Small wooden wedges introduced into the interproximal spaces, after fitting of the matrix, force the band material against the cavity edges and are the surest aids to avoiding cervical excess. These wedges are

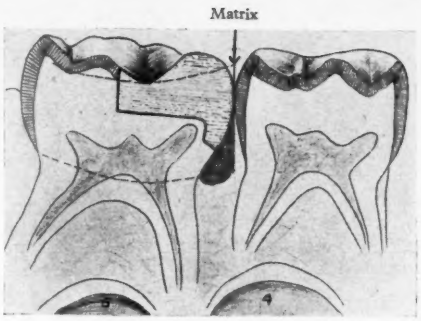


Fig. 7.

removed only after the amalgam has been adequately condensed in the cavity. Before inserting the amalgam ensure that if the band is to be left in place for any length of time it is free of the bite. The amalgam is now inserted and well condensed. To avoid fracture across the junction of the key and the main body of the filling the cavity outline has already been modified. Whilst the amalgam is setting it must also be protected from the full impact of the opposing cusp. This is done by carefully checking the bite and if necessary by stoning away a little of the opposing cusp. This not only relieves the bite but also allows a slightly thicker bulk of amalgam in this vital area which must *not* be contoured deeply.

I am indebted to Mr. J. B. Jackson, A.R.P.S., for photographing my diagrams.

Abstract

The Occurrence of the Lactate Fermenting Anærobe, Micrococcus Lactilyticus, in Human Saliva.—Although *Micrococcus lactilyticus* was first observed by Lewkowicz in 1901 and was subsequently shown by Hall and Howitt (1925) to be present in large numbers in saliva, it has received scant attention. *M. lactilyticus* is Gram negative and anaerobic and is capable of fermenting only lactate and the other related compounds, pyruvate and malate. By conversion of these salts into salts of weaker acids (proprionic and acetic) it tends to raise the pH of its environment. Its occurrence in saliva is probably dependent upon the presence of other bacteria that convert sugars to lactic acid. Diluted samples of saliva obtained from a number of subjects were plated on a special medium containing sodium lactate, and incubated anaerobically. Under these conditions *M. lactilyticus* develops compact lens shaped colonies readily in 48 hours. Streptococci also develop colonies but these can readily be distinguished. *M. lactilyticus* was present in all of the salivas, in numbers varying from 3 million to 340 million per millilitre and there is little doubt that this organism constitutes a significant portion of the indigenous flora of human saliva.—H. C. Douglas (1950) *J. dent. Res.*, **29**, 304.

Note and Comment

International Dental Journal

THE efforts of many ardent workers within the F.D.I., whose ambition to produce a new international journal was frustrated in 1939 by the outbreak of the Second World War, have at last been brought to fruition. The first number of the new official quarterly journal of the Federation Dentaire Internationale, the International Dental Journal, of which Professor H. H. Stones is the Editor in Chief, and Cassell & Co. Ltd. are the publishers, was published in September. This first issue sets a very high standard in every branch of journal production and reflects great credit upon all those concerned in its publication. It contains seven articles, all by eminent contributors, which take the form of up-to-date reviews of a number of dental matters of topical interest, ranging from the Proteolytic Theory of Dental Caries, Balanced Occlusion in the Natural Dentition, Chemotherapy in Dental Practice, to the Public Dental Services of Great Britain. Although the articles are all in English, the journal is cosmopolitan not only by virtue of its contributors from many parts of the world, but for the benefit of those by whom English is not understood, headings, summaries and legends to illustrations are in French, German, Italian and Spanish also. Judging from the list of contributions promised for the next issue which will be in December, the wide appeal which the first issue will undoubtedly have is likely to continue.

The Schools

Liverpool University Dental Students Society—The Annual Ball of the Society is to be held on Thursday, November 9. Tickets, price 15s. 6d. can be obtained from the Hon. Treasurer, Liverpool University Dental Students Society, Dental Hospital, Pembrook Place, Liverpool, 7.

Our Diary

Monday, October 23.

Worthing and District Section.—Worthing Squash Club, George V Avenue, 7 for 7.15 p.m.

The Royal Society of Medicine—Section of Odontology.—1, Wimpole Street, London, W.1, 5.30 p.m. Presidential Address: "The Evolution of Oral Surgery," W. Kelsey Fry.

Tuesday, October 24.

Preston, Leyland and Chorley Section.—Starkie House, Starkie Street, Preston, 7 p.m. "Latest Dental News," H. M. Clothier; "Interesting Factors in General Anæsthesia," G. Ashcroft.

Wednesday, October 25.

West of Scotland Branch.—Royal Faculty of Physicians and Surgeons, 242, St. Vincent Street, Glasgow, C.2, 7.30 p.m. "Current Dental Events," Arthur H. Condry.

Thursday, October 26.

West Lancashire, West Cheshire and North Wales Branch.—University of Liverpool, 7.30 p.m. "Partial Dentures," Professor J. Osborne.

Friday, October 27.

West Kent Section.—Wrotham Park Club. Dinner 7.30 p.m. "Radiography," Dr. Ingram.

Central Counties Branch.—Joint Meeting with the Birmingham Dental Students' Society, Birmingham Medical Institute, Gt. Charles Street, Birmingham, 7 p.m. "A System of Bridgework," A. R. F. Thompson.

Guildford and District Section.—The Lion Hotel, Guildford, 8 p.m. "Paradontal Disease and Treatment," Dr. E. Wilfred Fish.

Saturday, October 28.

South Wales and Monmouthshire Branch.—Annual Meeting, Westgate Hotel, Newport, 2 p.m. Annual Dinner, 6.45 for 7.15 p.m.

Wednesday, November 1.

East Lancashire and East Cheshire Branch.—Midland Hotel, Manchester, 7.30 p.m. "Your Problems," Professor E. Matthews.

Thursday, November 2.

Public Dental Officers' Group—North Western Division.—Town Hall Annexe, Manchester, 2.30 p.m. "Minor Oral Surgical Problems," B. V. Janes.

Northern Counties Branch.—Sutherland Dental School, Northumberland Road, Newcastle-on-Tyne, 5.30 p.m. "The Problem of Caries," Professor H. E. Frisbie, University of California.

Saturday, November 4.

Public Dental Officers' Group—Yorkshire Division.—Annual Meeting Y.M.C.A., Albion Place, Leeds 1, 3 p.m.

Monday, November 6.

Metropolitan Branch—South Eastern Section.—War Memorial Hospital, Shooters Hill, London, S.E.18, 8 p.m., preceded by coffee 7.30 p.m. "Speech Therapy," Miss Geraldine Martin.

Metropolitan Branch—Finchley Sub-Section.—319, Ballards Lane, N.12, 8 p.m. "X-ray Interpretation," L. J. Godden.

Thursday, November 9.

Brighton and District Section.—Conjoint Meeting with the B.M.A. (Brighton Division), "The Dudley Hotel," Lansdowne Place, Hove, 8 p.m. "Anæsthesia," Dr. J. H. Challis.

University College Hospital Dental Society.—Medical School, University College Hospital, Gower Street, London, W.1, 7.30 p.m. "Jaw Fracture Treatment," G. J. Parfitt.

Friday, November 10.

West of Scotland Branch.—Annual Dinner and Dance, Central Station Hotel, Glasgow, 7 for 7.30 p.m.

FORTHCOMING MEETINGS AT HEADQUARTERS

October	19	Council	10 a.m.
,,	20	Law and Ethics Committee	9.30 a.m.
,,	20	Hospitals Group Committee	11 a.m.
,,	20	Library and Museum Committee ...	12 noon
,,	20	Benevolent Fund. Adjourned Annual Meeting	2 p.m.
,,	20	Representative Board	2.30 p.m.
,,	21	Representative Board	10 a.m.
Nov.	6	Health Acts Committee	9.30 a.m.
,,	6	Reorganisation Committee	10 a.m.

Owing to the continuance of the dispute in the printing trade it has only been possible to produce this issue of the Journal in an attenuated form. We greatly regret the inconvenience caused to readers, contributors and advertisers by the omission of many of the usual contents and can only ask for their indulgence.

BRITISH DENTAL JOURNAL

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